

MW & BC Funded Projects
MSU
1978-79

TITLE: Economic Feasibility of a Barley Syrup Processing

INSTITUTION: Montana State University

DEPARTMENT: Chemistry

RESEARCHERS: Kenneth J. Goering

AMOUNT FUNDED: \$5,586.00

OBJECTIVES:

1) This project was originally presented as a contingency which would not be activated until a pilot plant run had been completed by Dr. Ken Goering. It is now proposed that the project be initiated before the pilot plant run is completed. There are three reasons for this proposed modification.

(1) The ongoing lab work by Dr. Goering has been encouraging and the ability to predict the likely outcome of the pilot run has improved since early last spring.

(2) Because the pilot plant run has been delayed little work time will be available this fiscal year after the completion of the pilot plant run.

(3) Since the project leader is no longer department head, he will have more time to work on the project this fiscal year. The proposed budget should be modified and it seems likely that significant work can be done before the pilot plant run is completed.

=====

TITLE: Barley Syrup

INSTITUTION: Montana State University

DEPARTMENT: Chemistry

RESEARCHERS: Kenneth J. Goering

AMOUNT FUNDED: \$10,425.00

OBJECTIVES:

1) To determine the economic feasibility of making syrup from barley.

=====

TITLE: Management and Marketing Considerations for Grain Producers Under Risk and Uncertainty

INSTITUTION: Montana State University

DEPARTMENT: Montana Extension Services

RESEARCHERS: LeRoy D. Luft

AMOUNT FUNDED: \$17,610.00

OBJECTIVES:

1) The wheat farmer today is facing increased uncertainty as to the outcome of his decisions. This uncertainty comes both on the yield and price sides. Wide fluctuations in prices have caused grain producers to become increasingly aware of the importance of considering and implementing proper management and marketing decisions. These decisions become the most important functions of the producer.

=====

TITLE: Restoration of Fertility and Productivity of Montana Soils with Cereal-Legume Rotations and/or Chemical Fertilizers

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: J.R. Sims, V.W. Meints, A.J. Jones, R.E. Rodden

AMOUNT FUNDED: \$18,000.00

OBJECTIVES:

A) Complete the objectives of the project begun in 1977 where ¹⁵N labeled fertilizer was applied to spring wheat on fallowed and on recropped soils.

- 1) Evaluate the proportions of N in small grains derived from fertilizer and from indigenous soil N.
 - 2) Evaluate N application rates needed to maintain optimum yields with recrop and alternate crop-fallow management.
 - 3) Evaluate immobilization and mineralization of N under recrop and alternate crop-fallow management.
 - 4) Evaluate relationships between optimum N fertilizer rates and initial soil fertility levels and environmental factors.
 - 5) Evaluate leaching of N under recrop and alternate crop-fallow management.
 - 6) Determine the factors limiting production under recrop and alternate crop-fallow management.
- B. Adapt cereal-legume rotations for restoring the fertility and productivity of Montana soils.
- 1) Develop annual forage legume-cereal rotations.
 - 2) Develop annual grain legume-cereal rotations.
 - 3) Further evaluate biennial sweetclover-cereal rotations.
 - 4) Further evaluate perennial legume-cereal rotations.
- C. Evaluate times, rates, and methods of application of anhydrous ammonia, nitrogen solutions, and urea as the primary N source for small grains.

=====

TITLE: To Develop Cultural Methods Suitable for the
Continuous Cropping of the Drylands of Montana

INSTITUTION: Montana State University

DEPARTMENT: Agricultural Research Centers

RESEARCHERS: Various

AMOUNT FUNDED: \$25,000.00

OBJECTIVES:

1) The development of continuous cropping systems to replace the present fallow system is a complex problem. Many unforeseeable conditions arise. Less time is available for seedbed preparation. More land will have to be seeded and harvested annually. Weeds and other pests will probably be more troublesome. The fertility moisture inventory, and plant population relationships will be more critical. The machinery, especially for seeding, will require modification. As seasons vary from year to year, more flexibility in respect to crop selection, methods of tillage, and methods of harvest or crop utilization will be required.

In view of the above problems, it becomes nearly impossible for any one Research Center to conduct research on all facets of any changes. Thus, each Center will work on some phase of the problem with the hope that the farmers will be able to put together a system of continuous cropping that will be best suited for his conditions.

=====

TITLE: Barley Improvement

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHERS: Bob Eastlick

AMOUNT FUNDED: \$31,000.00

OBJECTIVES:

1) Long-Term. Develop barleys for marketing in the Orient and processing for starch, syrups, etc. in the United States. Barleys for this purpose should have the waxy endosperm gene and probably should be hullless. For the initial Japanese market they should have medium sized seed and a large seed for the processing market. At some point the high lysine characteristic should be incorporated.

Immediate Objectives.

- a) Incorporate the hullless gene in adapted varieties.
- b) Develop rapid assays for starch attached enzymes.

- c) Develop rapid assays for beta-glucans and beta glucanases.
- d) Develop a rapid assay for the high gibberellic acid gene that is in Nupana.
- e) Incorporate the waxy endosperm gene in adapted varieties.
- f) Given rapid assay techniques, incorporate desirable enzymatic levels.

2) Long-term. Develop Montana adapted malting barley varieties equal in quality to Klages. Quality features of Klages that are outstanding are extract, diastatic power, alpha-amylase, ease of modification, and good plumpness. Undesirable features are later maturity, tendency to sprout in the head, lower yields than Shabet, and lack of drought resistance.

Immediate Objectives. 1) Develop a rapid assay for alpha amylase. b) Select available materials in Betzes for germination speed and imbibition. c) Select in Betzes and/or Shabet derivatives for reduced dormancy. d) Determine the effect of these traits on malting quality. e) Select in Betzes and/or Shabet or derivatives high-alpha amylase types.

3) Long-term. Improve the yield and adaptation, including drought resistance, of barley varieties presently adapted to Montana, particularly in high lysine genotypes, hulless genotypes, waxy genotypes, and malting genotypes.

Immediate Objectives. 1) Mutate and select for large seed in Montana varieties including Betzes, Shabet, Washonupana, Nupana, Watan, and Wabet. b) Mutate and select for a range of maturities in Betzes and Shabet. c) Develop early maturing recurrent selection populations of spring and winter barleys. d) Through yield trials and other tests determine the effect of maturity and large seed in these isolines and populations on yield, adaptation, and quality.

4) Long-term. Incorporate high lysine in varieties grown in Montana.

Immediate Objectives. 1) Mutate, sieve for plump, and screen for high lysine with the half seed technique for plump high lysine mutants in Washonupana, Shabet, and waxy endosperm genotypes. b) Continue recurrent selection populations for high lysine using a sieve as the selection tool in populations homozygous for high lysine. c) Isolate and evaluate for yield and lysine content potential new varieties. d) Continue genetic and other evaluations of high lysine lines.

=====

=====

TITLE: Winter Wheat Improvement

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Science

RESEARCHERS: Allan Taylor, G. Hollis Spitler, Judy Sever,
John Fredrickson, Muhammed Khan

AMOUNT FUNDED: \$18,000.00

OBJECTIVES:

- 1) Support research of winter wheat breeding project.
- 2) Shatter resistant 'Cheyenne'.
- 3) Field test plot type and size.

=====

=====

TITLE: Resistance and/or Tolerance of Wheat to leaf and
Head Blotch Diseases (controlling wheat leaf spot diseases).

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology

RESEARCHERS: A. L. Scharen, USDA SEA

AMOUNT FUNDED: \$7,000.00

OBJECTIVES:

- 1) To increase the quality and quantity of Montana wheats by
holding losses from leaf spots to a minimum.

=====

=====

TITLE: Control of Rust Diseases of Wheat

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology

RESEARCHERS: E. L. Sharp

AMOUNT FUNDED: \$14,000.00

OBJECTIVES:

- 1) Identify types and sources of resistance to rust diseases of wheat.
- 2) Selection of wheats with slow rusting characteristics tolerant to rust infection.
- 3) Incorporation of broad based resistance into acceptable wheat types.

=====

TITLE: Economic Feasibility of a Barley Syrup Processing Plant in Montana with Emphasis on Estimating the Impact on the Prices Received by Producers.

INSTITUTION: Montana State University

DEPARTMENT: Agricultural Economics & Economics

RESEARCHERS: Dick McConnen

AMOUNT FUNDED: \$15,000.00

OBJECTIVES:

The exact procedures will depend on the outcome of the pilot plant run. However, the following issues will have to be dealt with.

- 1) The pilot plant run results must be reviewed carefully with Dr. Goering and the people making the pilot plant run. Data on costs and conversion rates is required.

- 2) The market for the principle products must be investigated.

- a. The Montana cost of alternative sources of feed protein must be investigated and a reasonable value established. Potential feeding problems must be reviewed by animal nutritionists.

- b. The food protein market is not well understood. The

long run future trends of both the domestic and export market must be studied and potential evaluated.

c. The market for syrup sweeteners must be evaluated. At the present time, this industry seems to have excess capacity and the competition from corn syrups is substantial. What does the long run hold? What are the potentials for non-metabolizable sweeteners developed from maltose syrup?

3) Where are the markets and how would the location of a plant be influenced by freight rates? What kind of rate structure and market would be required to favor the development of a processing plant in Montana?

4) What sort of an organizational structure would yield the greatest return to Montana grain producers? What levels of employment and payroll would be generated by such a plant? What sort of marketing contracts would be needed to insure appropriate coordination between the producers and the processing plant or plants?

5) If such a barley processing industry is advantageous to Montana, what sort of educational program is needed with respect to a) possible use of renewable resource state funds to lessen plant investment costs in the private sector? b) the required continuing effort on barley, chemical, and management research and extension? c) increase the levels of understanding of the organizational alternatives so that the alternative will be selected which will have the greatest positive impact on Montana?